



US008904017B2

(12) **United States Patent**
Yoon et al.

(10) **Patent No.:** **US 8,904,017 B2**
(45) **Date of Patent:** **Dec. 2, 2014**

(54) **MOBILE DEVICE AND CONTROL METHOD THEREOF**

(75) Inventors: **Jong-hyun Yoon**, Seoul (KR); **Sang-su Nam**, Seoul (KR); **Jae-min Ahn**, Seoul (KR); **Dae-sung Cho**, Suwon-si (KR); **Hyun-gyoo Yook**, Seoul (KR)

(73) Assignee: **Samsung Electronics Co., Ltd.**, Suwon-si (KR)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 248 days.

(21) Appl. No.: **12/958,007**

(22) Filed: **Dec. 1, 2010**

(65) **Prior Publication Data**

US 2011/0131337 A1 Jun. 2, 2011

Related U.S. Application Data

(60) Provisional application No. 61/265,923, filed on Dec. 2, 2009, provisional application No. 61/265,939, filed on Dec. 2, 2009.

(30) **Foreign Application Priority Data**

Nov. 22, 2010 (KR) 10-2010-0116091

(51) **Int. Cl.**
G06F 15/16 (2006.01)
H04M 1/725 (2006.01)
H04W 88/02 (2009.01)

(52) **U.S. Cl.**
CPC **H04M 1/72583** (2013.01); **H04W 88/02** (2013.01)
USPC **709/228**; **709/220**

(58) **Field of Classification Search**
None
See application file for complete search history.

(56) **References Cited**

U.S. PATENT DOCUMENTS

6,175,789	B1	1/2001	Beckert et al.	
6,757,269	B2 *	6/2004	Dorenbosch et al.	370/338
6,775,267	B1 *	8/2004	Kung et al.	370/352
7,672,695	B1 *	3/2010	Rainnie et al.	455/574
8,516,096	B2 *	8/2013	LeBlanc et al.	709/223
2003/0100308	A1 *	5/2003	Rusch	455/445
2004/0097228	A1 *	5/2004	Saada	455/432.1
2004/0233930	A1 *	11/2004	Colby, Jr.	370/464
2004/0264402	A9 *	12/2004	Whitmore et al.	370/328
2005/0060425	A1 *	3/2005	Yeh et al.	709/232
2005/0090292	A1 *	4/2005	Yasutake	455/567

(Continued)

FOREIGN PATENT DOCUMENTS

CN	101325769	A	12/2008
CN	1 01 38881 9	A	3/2009

(Continued)

OTHER PUBLICATIONS

International Search Report [PCT/ISA/210] issued by the International Searching Authority in International Application No. PCT/KR2010/008602 on Aug. 23, 2011.

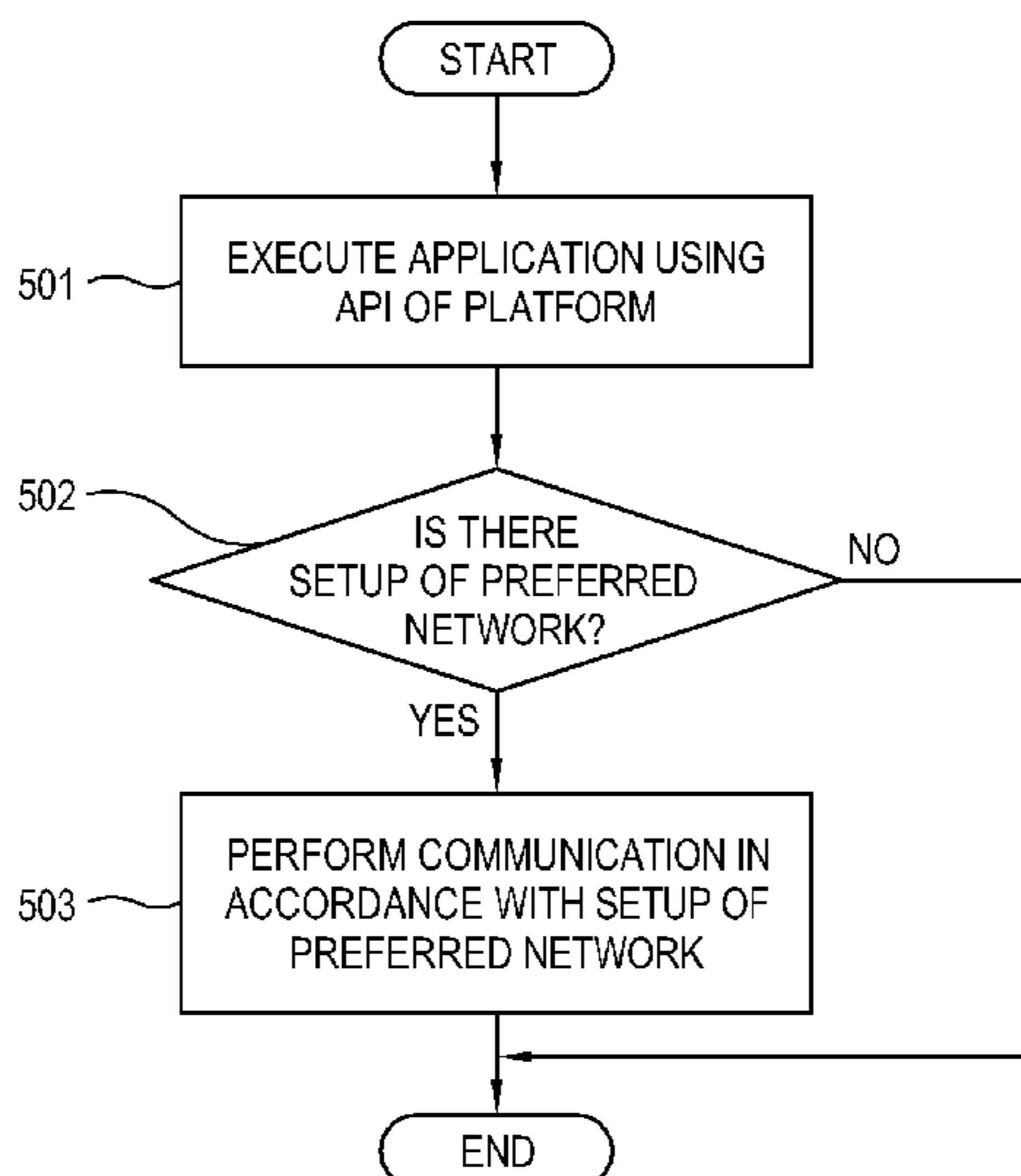
(Continued)

Primary Examiner — Ninos Donabed
(74) *Attorney, Agent, or Firm* — Sughrue Mion, PLLC

(57) **ABSTRACT**

The mobile device includes a communication unit which performs communication through a network; and a control unit which executes an application prepared by an application programming interface (API) of the network function provided by a platform, and controls the communication unit to perform communication in accordance with a setup of a preferred network if the application includes the setup of the preferred network.

13 Claims, 6 Drawing Sheets



(56)

References Cited

U.S. PATENT DOCUMENTS

2005/0128968	A1 *	6/2005	Yang	370/312
2005/0195390	A1	9/2005	Jeon et al.	
2005/0228870	A1 *	10/2005	de Boor et al.	709/219
2006/0015636	A1	1/2006	Skraba et al.	
2006/0039335	A1 *	2/2006	Ono et al.	370/338
2006/0126649	A1 *	6/2006	Akiyoshi	370/401
2006/0258353	A1 *	11/2006	Makela et al.	455/435.2
2006/0288329	A1	12/2006	Gandhi et al.	
2007/0004393	A1 *	1/2007	Forsberg et al.	455/420
2007/0011665	A1	1/2007	Gandhi et al.	
2008/0039079	A1 *	2/2008	Iyer et al.	455/432.1
2008/0056212	A1 *	3/2008	Karaoguz et al.	370/338
2008/0109877	A1 *	5/2008	Park et al.	726/3
2008/0160967	A1 *	7/2008	Narasimhan et al.	455/414.1
2008/0299960	A1 *	12/2008	Lockhart et al.	455/418
2009/0011738	A1 *	1/2009	Sasakura	455/410
2009/0245215	A1 *	10/2009	Oshime	370/338
2009/0254639	A1 *	10/2009	Manchester et al.	709/220
2009/0310509	A1 *	12/2009	Kumai et al.	370/254
2010/0008291	A1 *	1/2010	LeBlanc et al.	370/328
2010/0150001	A1	6/2010	Tsuchiya	

FOREIGN PATENT DOCUMENTS

JP	200672969	A	3/2006
JP	2006074295	A	3/2006
KR	10-2006-0058590	A	5/2006
KR	10-2006-0076546	A	7/2006
KR	10-2007-0095048	A	9/2007
KR	10-2009-0121435	A	11/2009
WO	2006109159	A2	10/2006
WO	2008032479	A1	3/2008

OTHER PUBLICATIONS

Communication, dated Jun. 25, 2014, issued by the State Intellectual Property Office of P.R. China in counterpart Patent Application No. 201080054231.0.

Communication, dated Sep. 9, 2014, issued by the Japanese Patent Office in counterpart Patent Application No. 2012-541945.

Communication dated Oct. 9, 2014 issued by the Australian Government IP Australia in counterpart Australian Patent Application No. 2010327451.

* cited by examiner

FIG. 1

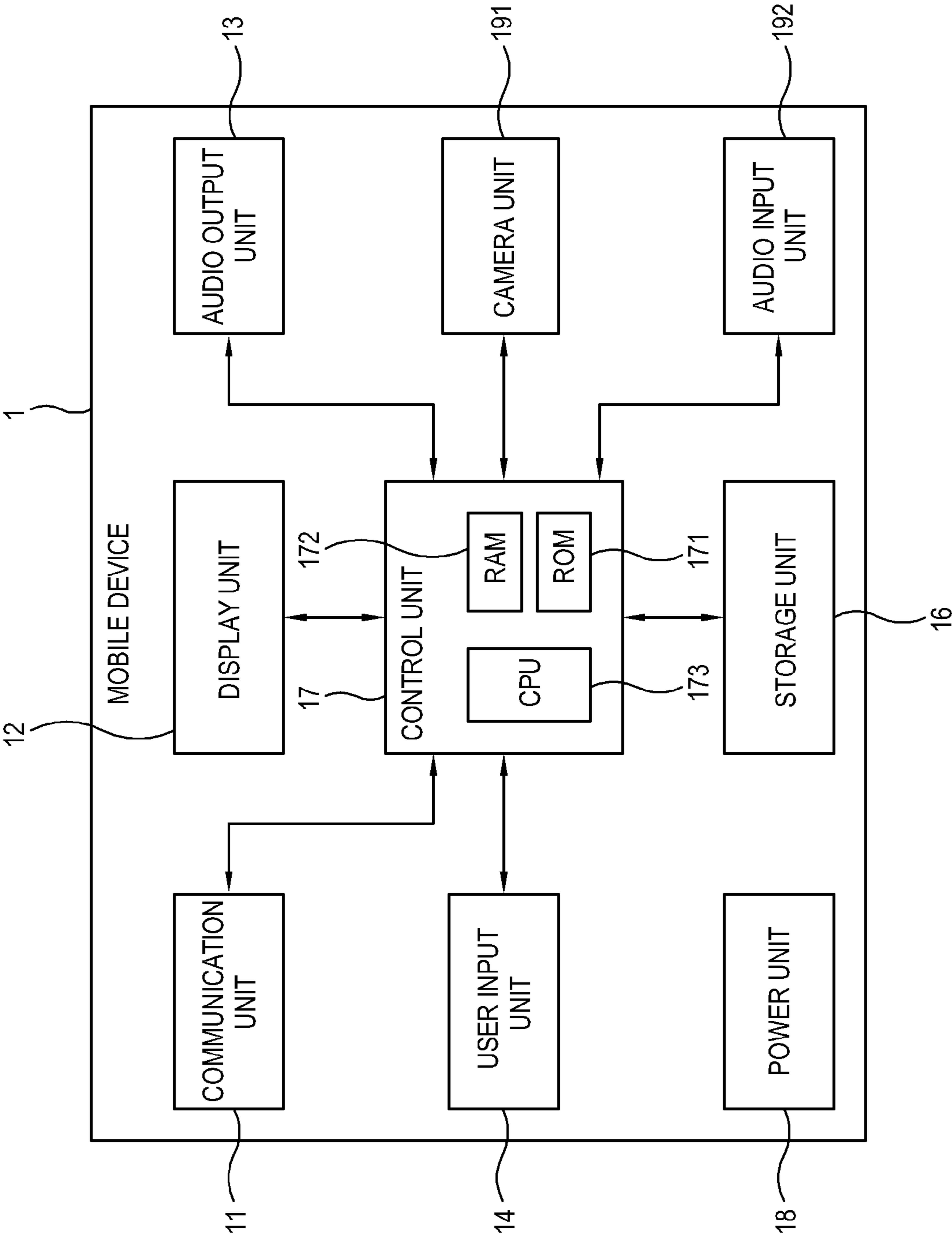


FIG. 2

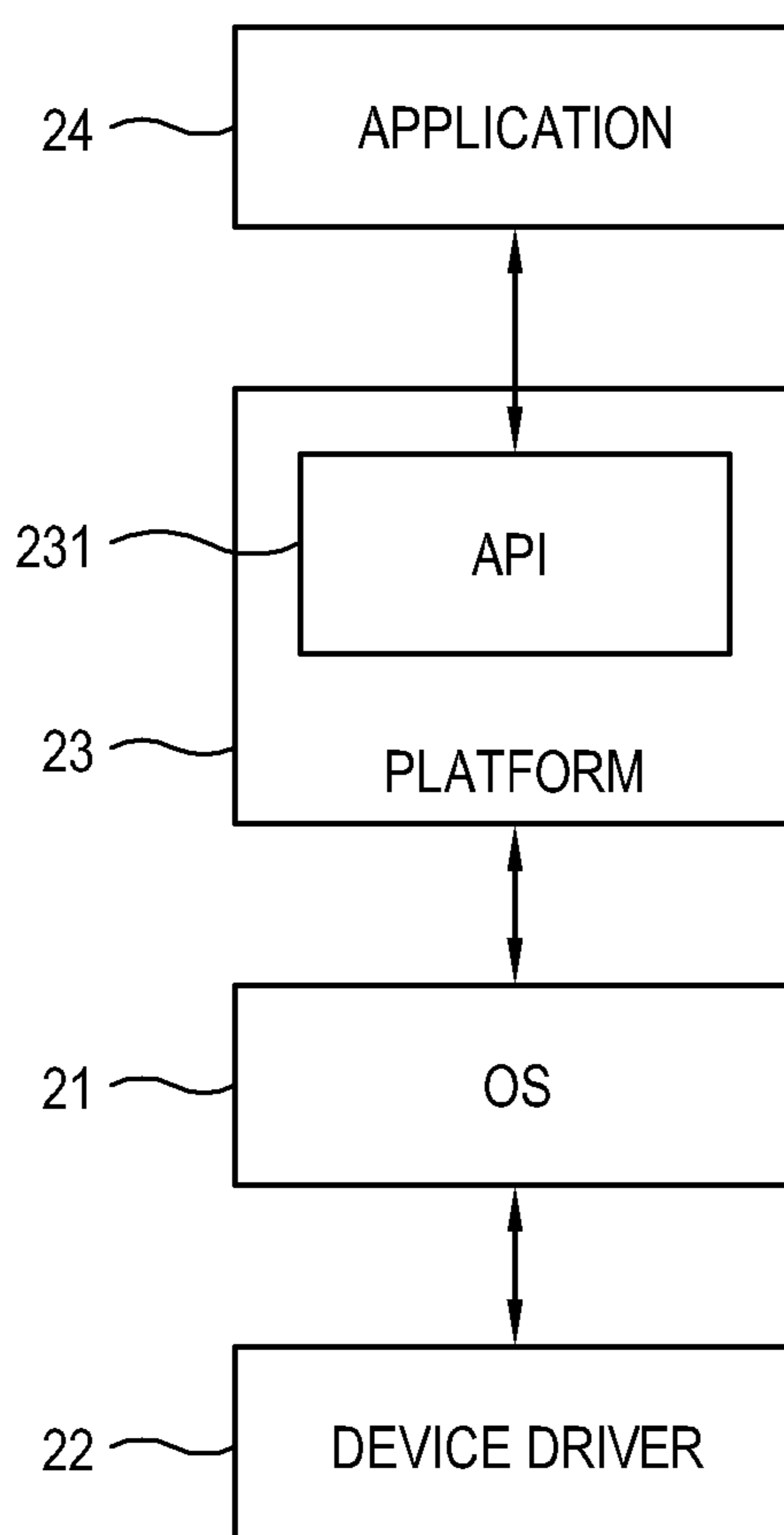


FIG. 3

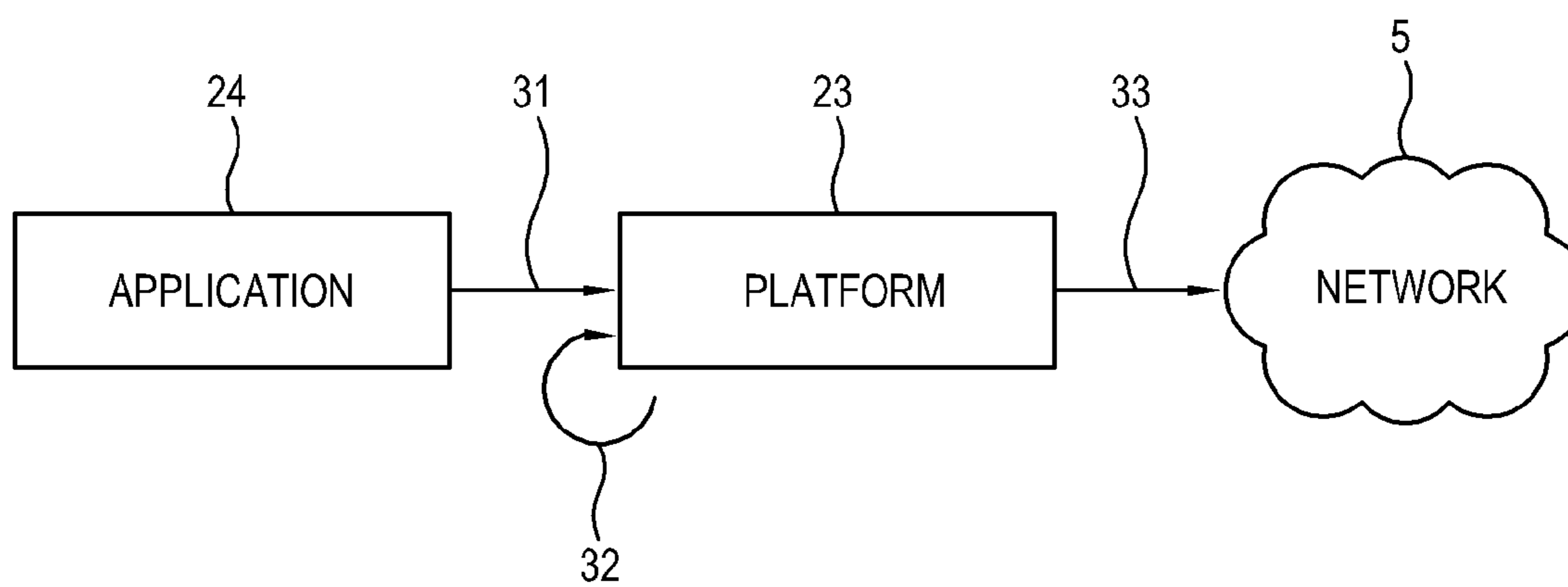


FIG. 4

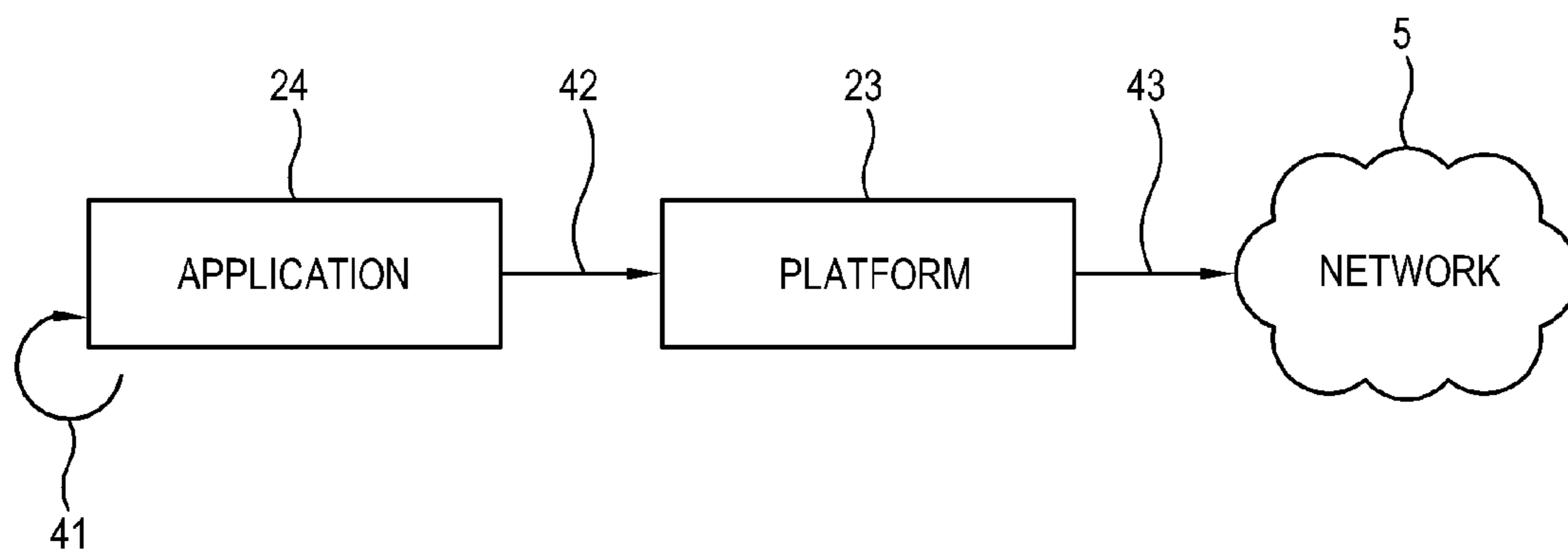


FIG. 5

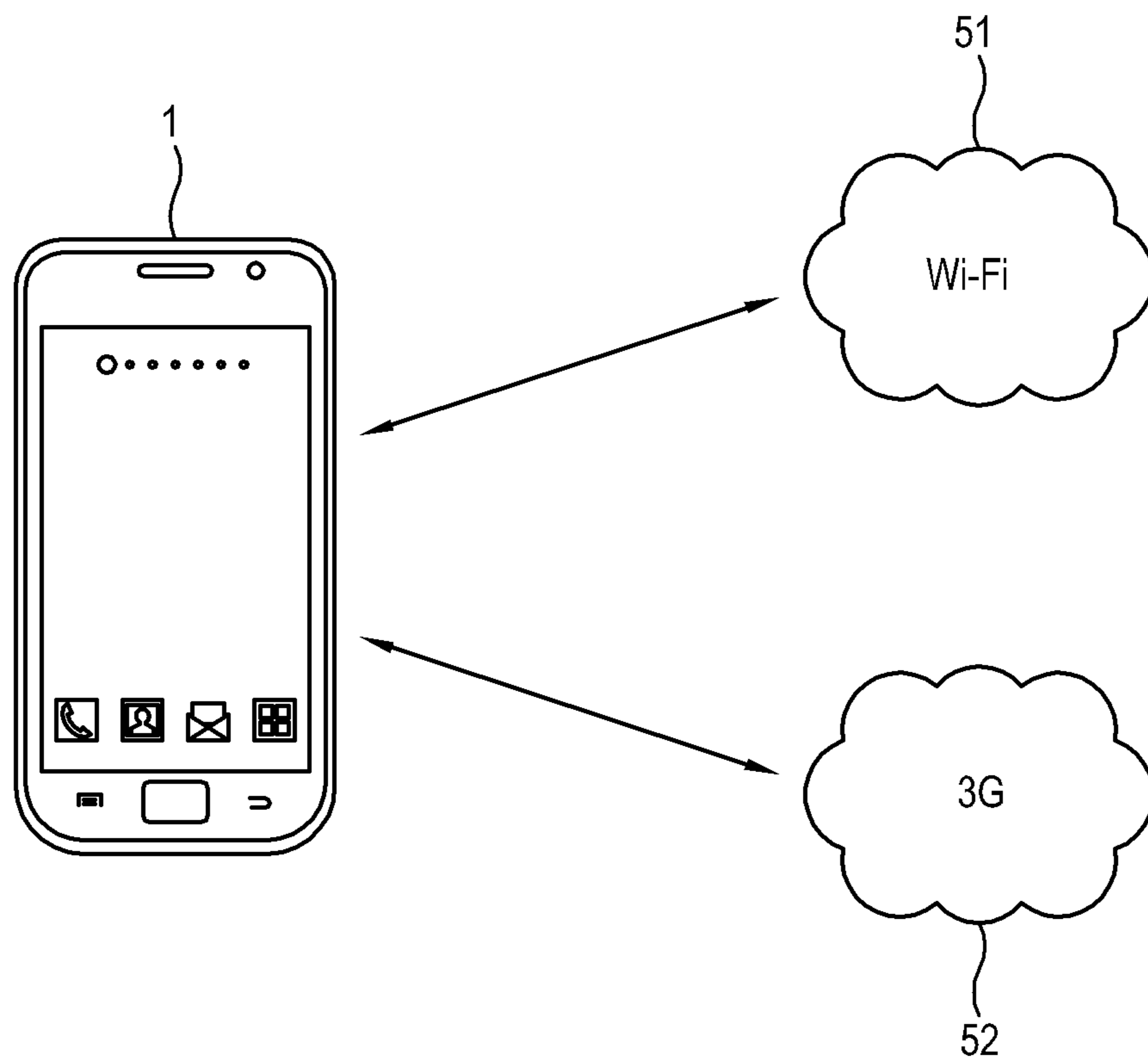
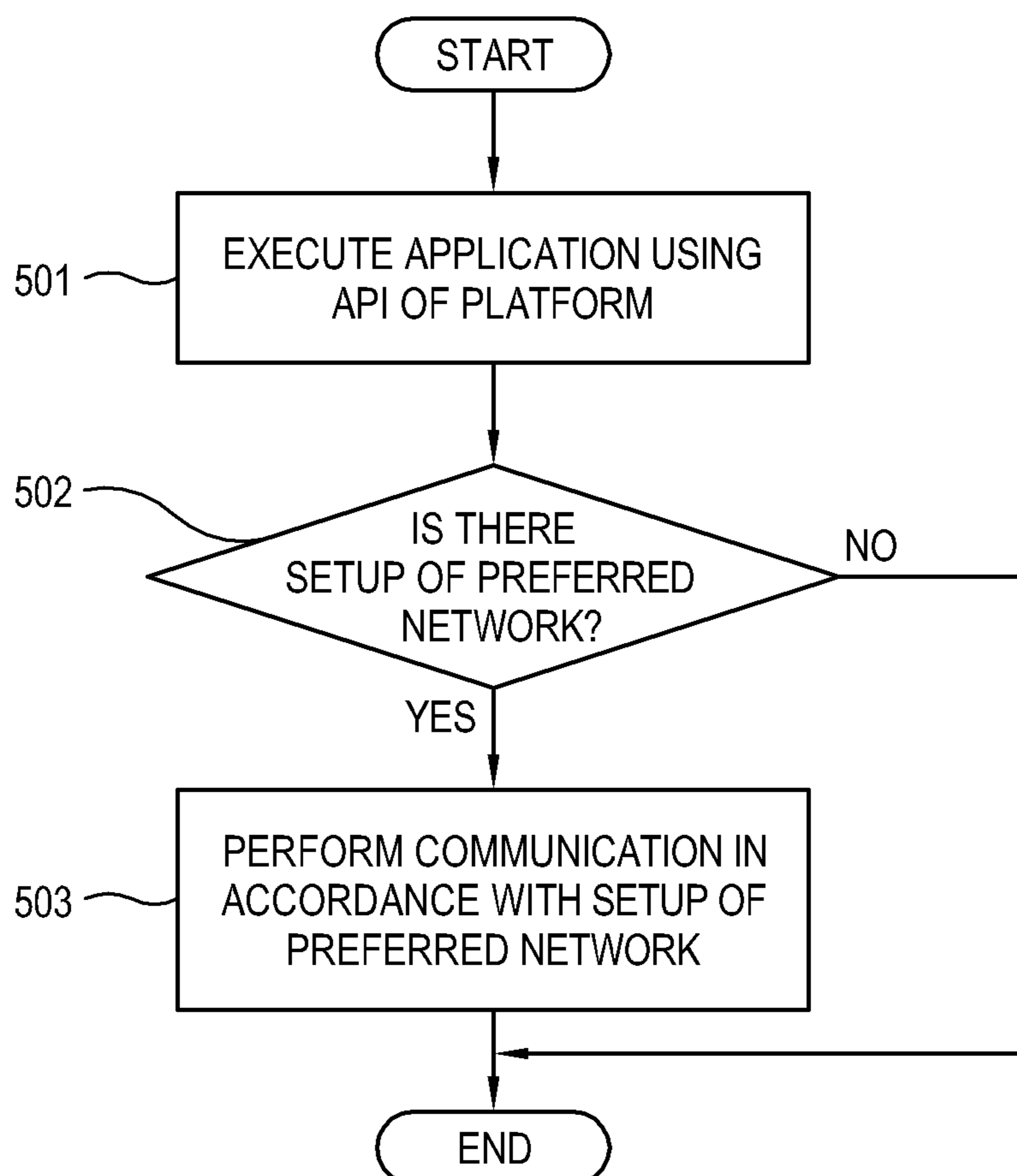


FIG. 6



MOBILE DEVICE AND CONTROL METHOD THEREOF

CROSS-REFERENCE TO RELATED APPLICATIONS

This application claims priority from U.S. Patent Provisional Application Nos. 61/265,923 and 61/265,939, filed Dec. 2, 2009, and Korean Patent Application No. 10-2010-0116091 filed Nov. 22, 2010, in the Korean Intellectual Property Office, the disclosures of which are incorporated herein by reference in their entireties.

BACKGROUND

1. Field

Apparatuses and methods consistent with exemplary embodiments relate to a mobile device and a control method thereof, and more particularly, to a mobile device capable of providing a network function and a control method thereof.

2. Description of the Related Art

A mobile device such as a cellular phone, a smart phone, a tablet personal computer (PC), etc. performs communication through various networks such as third generation (3G), Wi-Fi, etc. Such various networks have their merits and deficiencies regarding connectivity, speed, costs, etc. Thus, it is desirable to selectively use various networks in accordance with purpose or intention.

Meanwhile, an application of a mobile device often uses a network service supported by an operating system (OS), a platform or the like of the mobile device in order to provide a function useful to a user.

However, the OS, the platform, or the like of a related art mobile device does not sufficiently support an application developer to conveniently develop an application in association with the network. Therefore, enhancement of an application developing environment is desirous.

SUMMARY

Exemplary embodiments address at least the above problems and/or disadvantages and other disadvantages not described above. Also, an exemplary embodiment is not required to overcome the disadvantages described above, and an exemplary embodiment may not overcome any of the problems described above.

One or more exemplary embodiments provide a mobile device capable of providing a developing environment in which a preferred network can be more easily set up, and a control method thereof.

According to an aspect of an exemplary embodiment, there is provided a mobile device providing a network function, the mobile device including a display unit which displays an image; a user input unit which receives an input of a user; a communication unit which performs communication through a network; and a control unit which executes an application prepared by an application programming interface (API) of the network function provided by a platform, and controls the communication unit to perform communication in accordance with setup of a preferred network if the application includes the setup of the preferred network.

The platform may define a plurality of operation modes related to the preferred network, the application may include setup of a variable representing one of the plurality of operation modes, and the control unit may control the communication unit to operate in the operation mode corresponding to the setup of the variable.

The plurality of operation modes may include use of Wi-Fi first, use of only a packet switched (PS) domain, and use of only Wi-Fi.

A network connection by the platform may include a default network connection where the application does not specify the network connection, and a custom network connection where the application is enabled to directly control the network, and the control unit may control the communication unit to perform communication in accordance with the setup of the preferred network in the case of the default network connection.

According to another aspect of an exemplary embodiment, there is provided a control method of a mobile device providing a network function, the control method including executing an application prepared by an API provided by a platform of the mobile device; and performing communication in accordance with setup of a preferred network if the application includes the setup of the preferred network.

The platform may define a plurality of operation modes related to the preferred network, the application may include setup of a variable representing one of the plurality of operation modes, and the performing the communication may include performing communication to operate in the operation mode corresponding to the setup of the variable.

The plurality of operation modes may include use of Wi-Fi first, use of only a PS domain, and use of only Wi-Fi.

A network connection by the platform may include a default network connection where the application does not specify the network connection, and a custom network connection where the application is enabled to directly control the network, and the performing the communication may include performing the communication in accordance with the setup of the preferred network in the case of the default network connection.

BRIEF DESCRIPTION OF THE DRAWINGS

The above and/or other aspects will become more apparent from the following description of exemplary embodiments, taken in conjunction with the accompanying drawings, in which:

FIG. 1 is a block diagram showing a configuration of a mobile device according to an exemplary embodiment;

FIG. 2 is a block diagram showing a software configuration of the mobile device of FIG. 1;

FIGS. 3 and 4 show network connection types of the mobile device according to an exemplary embodiment;

FIG. 5 is a view for explaining a preferred network of the mobile device according to an exemplary embodiment; and

FIG. 6 is a flowchart showing an operation of the mobile device according to an exemplary embodiment.

DETAILED DESCRIPTION OF EXEMPLARY EMBODIMENTS

Certain exemplary embodiments are described in greater detail below with reference to accompanying drawings.

In the following description, like drawing reference numerals are used for like elements, even in different drawings. The matters defined in the description, such as detailed construction and elements, are provided to assist in a comprehensive understanding of exemplary embodiments. However, exemplary embodiments can be practiced without those specifically defined matters.

FIG. 1 is a block diagram showing a configuration of a mobile device according to an exemplary embodiment. The mobile device 1 shown in FIG. 1 may include, for example, a

3

cellular phone, a smart phone, a tablet personal computer (PC), etc. The mobile device **1** may include a communication unit **11**, a display unit **12**, an audio output unit **13**, a user input unit **14**, a storage unit **16**, a control unit **17**, a power unit **18**, a camera unit **191**, and an audio input unit **192**.

The communication unit **11** performs communication through a network. The contents and type of the communication performed by the communication unit **11** may vary depending on use and function of the mobile device **1**. For example, in the case of a telephone function, the communication unit **11** calls the other device (not shown) for telephone conversation. In this exemplary embodiment, the calling type includes 3G. In the case of an Internet function, the communication unit **11** performs Internet connection with a predetermined server (not shown) for transmitting/receiving data. Further, the communication unit **11** may perform communication with a peripheral device (not shown) through local communication such as Bluetooth, WiFi, etc. The communication unit **11** performs the communication under control of the control unit **17**.

The display unit **12** displays an image representing the operation or state of the mobile device **1**. The display unit **12** may display an image by using various display devices including, for example, a liquid crystal display (LCD), an organic light emitting device (OLED), etc. The audio output unit **13** outputs an audio representing the operation or state of the mobile device **1**. The audio output unit **13** may include an audio processor (not shown) that processes an audio signal, and a loudspeaker (not shown) that outputs an audio based on an audio signal.

The user input unit **14** receives a user's command. The user input unit **14** may receive a user's command in various forms, which may include a key input unit (not shown) that receives a user's command by a key input, and a touch input unit (not shown) that receives a user's command by a touch input. A touch input unit may include a touch screen provided in the display unit **12**.

The storage unit **16** is a non-volatile memory including, for example, a flash memory, a hard disk drive, etc., which stores data or programs for operating the mobile device **1**. The power unit **18** supplies power for operating the mobile device **1**. The camera unit **191** takes an image, and the audio input unit **192** may include a microphone or the like and receives an audio. Some of the above-described elements, for example, the camera unit **191**, or the like may be omitted from the mobile device **1** in consideration of its function or use.

The control unit **17** controls the operation of the elements in the mobile device **1**. The control unit **17** may include a read only memory (ROM) **171** where a control program for performing an operation is stored, a random access memory (RAM) **172** where the control program is at least partially loaded, and a central processing unit (CPU) **173** which executes the loaded control program. The control program of the control unit **17** may be stored in the storage unit **16** as well as in the ROM **171**. The control program of the control unit **17** may include a plurality of programs. FIG. 2 is a block diagram showing an exemplary configuration of the control program in the control unit **17**.

As shown in FIG. 2, the control program of the control unit **17** may include an OS **21**, a device driver **22**, a platform **23**, and an application **24**. The OS **21** manages and controls overall operations of the mobile device **1**. The device driver **22** performs an interface between a hardware device such as the communication unit **16** and the OS **21**. The platform **23** performs an interface between the OS **21** and the application **24**, and includes an API **231** for supporting the application **24**.

4

The application **24** performs at least one function, and may be prepared using the API **231** of the platform **23**. The function performed by the application **24** includes a network function. The application **24** may be transmitted from the external device through the communication unit **11** and installed on the mobile device **1**. That is, a user can download the application **24** via the Internet or the like and install it on the mobile device **1**.

The API **231** of the platform **23** includes an API for the network function which is also referred to as a network service. For example, a network connection representing an actual run-time session is initially established for transmitting and receiving data through a network using the platform **23**. To set up the network connection, a network account may be used. The network account encapsulates configuration parameters such as a protocol type, an access point name, a local Internet protocol (IP) address, a domain name system (DNS) address, authentication information, etc. After the network connection is successfully established, a data communication protocol such as a hyper text transfer protocol (HTTP), socket methods, etc. may be applied.

FIGS. 3 and 4 show network connection types of the mobile device according to an exemplary embodiment. FIG. 3 shows a default network connection, and FIG. 4 shows a custom network connection.

Referring to FIG. 3, the application **24** requests a network service of the platform **23** without a network connection via a request **31**. The network service (e.g., HTTP, socket methods, etc.) internally starts the default network connection in accordance with a preset default (as indicated by a reference numeral **32**). Next, the network service of the platform **23** accesses a network **5** via a connection **33**.

The default network connection shown in FIG. 3 is established because the application **24** does not specify the network connection, and therefore usage of the network is simplified in view of the application developer. Also, the platform **23** is allowed to fully manage the network connection. Thus, the application developers can easily and simply develop the application **24** even though they do not know complicated contents of the API **231**.

Referring to FIG. 4, the application **24** creates the custom network connection and starts it as indicated by a reference numeral **41**. Program 1 shows an example of the application **24** that creates and starts a custom network connection.

Program 1

```

// start the NetConnection
using namespace Osp::Net;
void
Test(void)
{
    // Account ID
    NetAccountId accountId = INVALID_HANDLE;
    result r = E_SUCCESS;
    // Account manager
    NetAccountManager netAccountManager;
    r = netAccountManager.Construct( );
    accountId =
netAccountManager.GetNetAccountId( );
    // Construct a Listener
    TestListener* pMyListener = new TestListener( );
    // NetConnection instance allocation
    NetConnection* pNetConnection = new
NetConnection;
    // NetConnection Construction
    r = pNetConnection->Construct(accountId);
    // _NetConnectionEvent AddListener
    r = pNetConnection-
```

5

-continued

Program 1

```

>AddNetConnectionListener(pMyListener);
    // NetConnection connect
    r = pNetConnection->Start( );
}

```

Referring back to FIG. 4, the application 24 requests a network service of the platform 23 with a network connection via a request 42. Next, the network service of the platform 23 accesses the network 5 via a connection 43.

The custom network connection described with reference to FIG. 4 may be for an advanced developer, and enables the application 24 to directly control the network 5. Thus, the application 24 can use a specific network account, and start or stop the network connection at any time. That is, the application developer is allowed to develop the application 24 that provides a more enhanced function.

The control unit 17 of an exemplary embodiment may enable the developer to perform communication with a desired network which may be referred to as a preferred network in accordance with a setup of the application 24. FIG. 5 is a view for explaining a preferred network of the mobile device in this exemplary embodiment. The preferred network in this exemplary embodiment includes Wi-Fi 51 and 3G 52. The 3G is an example of a PS domain. The control unit 17 may be connected to one of the preferred networks, i.e., the Wi-Fi 51 and the 3G 52 in accordance with the setup of the application 24.

The API 231 of the platform 23 defines a plurality of operation modes related to the preferred network. The application 24 includes setup of variables that represents one of the operation modes defined by the API 231 of the platform 23. Table 1 shows an example of variables corresponding to the operation modes related to the preferred network of the present exemplary embodiment, and Program 2 shows an example of the application 24 that sets up the preferred network. The platform 23 accomplishes connection to one preferred network between the Wi-Fi 51 and the 3G 52 with reference to the variables set up in the application 24.

TABLE 1

Variables	Operation modes
NET_WIFI_FIRST	Use of WI-FI first
NET_PS_ONLY	Use of only PS domain
NET_WIFI_ONLY	Use of only Wi-Fi

PROGRAM 2

```

Net::NetAccountManager::Construct( )
Net::NetAccountManager::SetNetPreference(NET_PS_ONLY)

```

In this exemplary embodiment, the platform 23 provides the foregoing simple API 231 in association with the preferred network, so that the application developer can readily perform the setup related to the preferred network by simply selecting the given variable of the API 231. Also, the setup of the preferred network may be applied to the default network connection described with reference to FIG. 3. In other words, although the application developer does not completely know the API 231 to accomplish the custom network connection described with reference to FIG. 4, the developer

6

is enabled to set up the preferred network even when the default network connection is used. Accordingly, there is provided an environment for more easily developing the application 24.

FIG. 6 is a flowchart showing an operation of the mobile device according to an exemplary embodiment. At operation 501, the application 24 using the API 231 of the platform is executed. At operation 502, it is ascertained whether the application 24 includes setup related to the preferred network. If the application 24 includes the setup related to the preferred network, at operation 503 the communication is performed in accordance with the setup of the preferred network.

As described above, there is provided a developing environment in which a preferred network can be more easily set up.

The foregoing exemplary embodiments and advantages are merely exemplary and are not to be construed as limiting. The present teaching can be readily applied to other types of apparatuses. Also, the description of the exemplary embodiments is intended to be illustrative, and not to limit the scope of the claims, and many alternatives, modifications, and variations will be apparent to those skilled in the art.

What is claimed is:

1. A mobile device for providing a network function, the mobile device comprising:

a communication unit which is implemented by a processor and performs communication through a network; and

a controller which executes an application prepared by an application programming interface (API) of the network function provided by a platform,

wherein the network function comprises a network service, the application comprises one of a first application which is an executable application and does not specify a network connection and a second application which is an executable application, specifies the network connection and requests the network service of the platform with the network connection,

the controller controls the communication unit to establish a first network connection based on a preset default of the platform in response to the first application being prepared by the API and executed, and to establish a second network connection controlled by the second application in response to the second application being prepared by the API and executed, and

wherein the second application creates and starts a custom network connection, and then requests the network service of the platform with the custom network connection, via a first request in which the network connection is specified, and

the platform accesses the network in response to the first request based on the custom network connection.

2. The mobile device according to claim 1, wherein: the platform defines a plurality of operation modes related to a preferred network, the application sets up one of the plurality of operation modes, and

the controller controls the communication unit to operate in the operation mode corresponding to the one of the plurality of operation modes.

3. The mobile device according to claim 2, wherein the plurality of operation modes comprises at least one of:

a use of Wi-Fi first,
a use of only a packet switched (PS) domain, and
a use of only Wi-Fi.

4. The mobile device according to claim 1, wherein the second application is enabled to directly control the network.

7

5. A control method for a mobile device, the control method comprising:

executing an application prepared by an application programming interface (API) provided by a platform of the mobile device, the application comprising one of a first application which is an executable application and does not specify a network connection and a second application which is an executable application, specifies the network connection and requests a network service of the platform with the network connection; and

establishing a first network connection based on a preset default of the platform in response to the first application being prepared by the API and executed and establishing a second network connection controlled by the second application in response to the second application being prepared by the API and executed,

wherein the second application creates and starts a custom network connection, and then requests the network service of the platform with the custom network connection, via a request in which the network connection is specified, and

the platform accesses the network in response to the request based on the custom network connection.

6. The control method according to claim 5, further comprising performing communication to operate in one of a plurality of operation modes related to a preferred network, wherein the platform defines the plurality of operation modes,

the application sets up one of the plurality of operation modes, and

the performing the communication comprises performing communication to operate in the operation mode corresponding to the one of the plurality of operation modes.

7. The control method according to claim 6, wherein the plurality of operation modes comprises at least one of:

a use of Wi-Fi first,

8

a use of only a packet switched (PS) domain, and
a use of only Wi-Fi.

8. The control method according to claim 5, wherein the second application is enabled to directly control the network.

9. The mobile device according to claim 1, further comprising:

a display which displays an image; and

a user input device which receives an input of a user.

10. The mobile device according to claim 1, wherein the first application requests a network service of the platform via a second request in which the network connection is not specified and the platform internally starts the first network connection in response to the second request based on pre-stored default network settings.

11. The mobile device according to claim 1, wherein the first application requests the network service of the platform without a previous network connection, via a second request in which the network connection is not specified, and

the platform internally starts the first network connection in response to the second request based on pre-stored default network settings.

12. The mobile device according to claim 1, wherein the API includes variables which respectively define operation modes comprising:

a mode to provide a Wi-Fi service first,

a mode to provide only a packet switched (PS) domain service, and

a mode to provide only Wi-Fi service; and

wherein one of the operation modes is set up in response to receiving a selection of one of the variables, to execute the second network connection.

13. The mobile device according to claim 1, wherein the selection of the one of the variables is provided by a user input.

* * * * *